

**CPC****COOPERATIVE PATENT CLASSIFICATION****E21B**

**EARTH DRILLING, e.g. DEEP DRILLING** ( mining, quarrying [E21C](#) ; making shafts, driving galleries or tunnels [E21D](#) ); **OBTAINING OIL, GAS, WATER, SOLUBLE OR MELTABLE MATERIALS OR A SLURRY OF MINERALS FROM WELLS**

**WARNING**

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

[E21B 1/12](#) to [E21B 1/38](#) covered by [E21B 1/00](#)  
[E21B 7/08](#) covered by [E21B 7/06](#)  
[E21B 11/04](#) covered by [E21B 27/00](#)  
[E21B 23/12](#) covered by [E21B 23/00D](#)  
[E21B 31/08](#) covered by [E21B 27/00](#)  
[E21B 43/22](#) covered by [C09K 8/58](#)

**Guidance heading: Methods or apparatus for drilling**

**E21B 1/00 Percussion drilling** ( drives used in the borehole [E21B 4/00](#); rotary drilling machines in general [B23B](#) )

- E21B 1/02 . Surface drives for percussion drilling
- E21B 1/04 . . Devices for reversing the movement of the rod or cable at the surface { not used, see [E21B 1/02](#) }

**E21B 3/00 Rotary drilling** ( drives used in the borehole [E21B 4/00](#); rotary drilling machines in general [B23B](#) )

- E21B 3/02 . Surface drives for rotary drilling
- E21B 3/025 . . with a to-and-fro rotation of the tool
- E21B 3/03 . . with an intermittent unidirectional rotation of the tool
- E21B 3/035 . . with slipping or elastic transmission
- E21B 3/04 . . Rotary tables { ( portable drilling rigs with rotary tables [E21B 7/021](#) ) }
- E21B 3/045 . . . { movably mounted on the drilling structure or platform ( derricks adapted to be moved on their substructure [E21B 15/003](#); specially adapted for underwater drilling, [E21B 15/02](#) ) }
- E21B 3/06 . . . Adaptation of rotary draw works to drive rotary tables ( connecting or disconnecting couplings or joints [E21B 19/16](#); rope, cable, or chain winding mechanisms, capstans [B66D](#) )

**E21B 4/00 Drives used in the borehole**

- E21B 4/003 . { Bearing, sealing, lubricating details ( for roller bits [E21B 10/22](#); bearings in general [F16C](#) ; sealing in general [F16J](#) ; lubricating in general [F16N](#) ) }

- E21B 4/006 . { Mechanical motion converting means, e.g. reduction gearings ( [E21B 4/10](#) takes precedence; gearings in general [F16H](#) ) }
- E21B 4/02 . Fluid rotary type drives ( [hydraulic turbines for drilling wells F03B 13/02](#) )
- E21B 4/04 . Electric drives ( [E21B 4/12](#) takes precedence )
- E21B 4/06 . Down-hole impacting means, e.g. hammers ( [percussion drill bits E21B 10/36](#); boring rams [E21B 11/02](#); releasing-jars [E21B 31/107](#) )
- E21B 4/08 . . impact being obtained by gravity only, e.g. with lost-motion connection
- E21B 4/10 . . continuous unidirectional rotary motion of shaft or drilling pipe effecting consecutive impacts
- E21B 4/12 . . Electrically operated hammers
- E21B 4/14 . . Fluid operated hammers
- E21B 4/145 . . . { of the self propelled-type, e.g. with a reverse mode to retract the device from the hole }
- E21B 4/16 . Plural down-hole drives, e.g. for combined percussion and rotary drilling ( [E21B 4/10 takes precedence](#) ); Drives for multi-bit drilling units
- E21B 4/18 . Anchoring or feeding in the borehole
- E21B 4/20 . combined with surface drive ( [E21B 4/10 takes precedence](#) )
- E21B 6/00** **Drives for combined percussion and rotary drilling ( drives used in the borehole [E21B 4/00](#) )**
- E21B 6/02 . the rotation being continuous
- E21B 6/04 . . Separate drives for percussion and rotation
- E21B 6/06 . the rotation being intermittent, e.g. obtained by ratchet device
- E21B 6/08 . . Separate drives for percussion and rotation
- E21B 7/00** **Special methods or apparatus for drilling**
- E21B 7/001 . { [Drilling a non circular hole](#) ( [excavating trenches E02F 5/02](#); cutting machines for slitting [E21C 25/00](#) ) }
- E21B 7/002 . { [Drilling with diversely driven shafts extending into the borehole](#) ( [simultaneously drilling and casing E21B 7/20](#); plural down-hole drives [E21B 4/16](#); [E21B 7/001](#) takes precedence ) }
- E21B 7/003 . { [Drilling with mechanical conveying means](#) ( [bailers, e.g. baskets, buckets E21B 27/00](#); tunnelling [E21D](#) ) }
- E21B 7/005 . . { [with helical conveying means](#) ( [E21B 7/201](#) takes precedence; augers [E21B 10/44](#); drilling rods or pipes with helical structure [E21B 17/22](#) ) }
- E21B 7/006 . . . { [combined with a bucket-type container](#) ( [bailers with helical conveying means E21B 27/04](#) ) }
- E21B 7/007 . { [Drilling by use of explosives](#) ( [underwater drilling using explosives E21B 7/1245](#);

setting-tools actuated by explosives [E21B 23/04](#), [E21B 23/065](#); cutting or destroying objects in boreholes by explosives [E21B 29/02](#); freeing objects using explosives [31/107B](#); gun or shaped-charge perforators [E21B 43/116](#); fracturing by explosives [E21B 43/263](#), [E21B 43/248](#); taking samples using explosives [E21B 49/04](#) ) }

- E21B 7/008 . { Drilling ice or a formation covered by ice }
- E21B 7/02 . Portable drilling rigs, truck-or skid-mounted, with their own drive ( portable drilling rigs for use on underwater floors [E21B 7/124](#) )
- E21B 7/021 .. { With a rotary table, i.e a fixed rotary drive for a relatively advancing tool ( rotary tables [E21B 3/04](#) ) }
- E21B 7/022 .. { Control of the drilling operation; Hydraulic or pneumatic means for activation or operation ( control circuits for drilling masts [E21B 15/045](#) ) }
- E21B 7/023 .. { the mast being foldable or telescopically retractable }
- E21B 7/024 .. { having means for adapting to inclined terrain; having means for stabilizing the vehicle while drilling }
- E21B 7/025 .. { Rock drills, i.e. jumbo drills }
- E21B 7/026 .. { having auxiliary platforms, e.g. for observation purposes }
- E21B 7/027 .. { Drills for drilling shallow holes, e.g. for taking soil samples or for drilling postholes }
- E21B 7/028 ... { the drilling apparatus being detachable from the vehicle, e.g. hand portable drills }
- E21B 7/04 . Directional drilling ( derricks or masts specially adapted therefor [E21B 15/04](#) )
- E21B 7/043 .. { for underwater installations }
- E21B 7/046 .. { horizontal drilling ( drilling with mechanical conveying means [E21B 7/003](#) ) }
- E21B 7/06 .. Deflecting the direction of boreholes { ( directional window cutting [E21B 29/06](#); deflecting the direction of fishing tools [E21B 31/14](#) ) }
- E21B 7/061 ... { the tool shaft advancing relative to a guide, e.g. a curved tube or a whipstock }
- E21B 7/062 ... { the tool shaft rotating inside a non-rotating guide travelling with the shaft ( [E21B 7/067](#) and [E21B 7/068](#) take precedence ) }
- E21B 7/064 ... { specially adapted drill bits therefor }
- E21B 7/065 ... { using oriented fluid jets }
- E21B 7/067 ... { with means for locking sections of a pipe or of a guide for a shaft in angular relation, e.g. adjustable bent sub }
- E21B 7/068 ... { drilled by a down-hole drilling motor ( down-hole drives per se [E21B 4/00](#), [E21B 7/067](#) takes precedence ) }
- E21B 7/10 .. Correction of deflected boreholes
- E21B 7/12 . Underwater drilling ( derricks or masts specially adapted therefor [E21B 15/02](#); telescoping joints [E21B 17/07](#); using heave compensators [E21B 19/09](#) )
- E21B 7/122 .. { with submersible vertically movable guide }
- E21B 7/124 .. with underwater tool drive prime mover, e.g. portable drilling rigs for use on underwater floors
- E21B 7/1245 ... { using explosive means ( Anchors driven in by explosive charges [B63B 21/28](#) ) }
- E21B 7/128 .. from floating support with independent underwater anchored guide base { guide line systems [E21B 33/035F](#) }

- E21B 7/132 . . from underwater buoyant support
- E21B 7/136 . . from non-buoyant support ( [E21B 7/124](#) takes precedence )
  
- E21B 7/14 . Drilling by use of heat, e.g. flame drilling { ( by use of explosives [E21B 7/007](#) ) }
- E21B 7/143 . . { [underwater](#) }
- E21B 7/146 . . { [Thermal lances](#) }
- E21B 7/15 . . of electrically generated heat
  
- E21B 7/16 . Applying separate balls or pellets by the pressure of the drill, so-called shot-drilling
  
- E21B 7/18 . Drilling by liquid or gas jets, with or without entrained pellets ( [E21B 7/14](#) takes precedence; { [obtaining a slurry of minerals](#) [E21B 43/29](#) }; hydraulic monitors [E21C 45/00](#) )
- E21B 7/185 . . { [underwater](#) }
  
- E21B 7/20 . Driving or forcing casings or pipes into boreholes, e.g. sinking; Simultaneously drilling and casing boreholes ( [surface means for applying to-and-fro rotation movements to the casing](#) [E21B 3/025](#); { [pushing means outside of the borehole](#) [E21B 19/08](#); } placing piles [E02D 7/00](#); sinking shafts while moving the lining downwards [E21D 1/08](#); { [making galleries by forcing prefabricated elements through the ground](#) [E21D 9/005](#) } )
- E21B 7/201 . . { [with helical conveying means](#) ( [drilling with helical conveying means](#) [E21B 7/005](#); [augers](#) [E21B 10/44](#); [drilling rods or pipes with helical structure](#) [E21B 17/22](#) ) }
- E21B 7/203 . . . { [using down-hole drives](#) ( [down-hole drives per se](#) [E21B 4/00](#) ) }
- E21B 7/205 . . { [without earth removal](#) ( [E21B 7/30](#) takes precedence ) }

**NOTE**

[Special methods or apparatus for drilling without earth removal](#) [E21B 7/26](#)

- E21B 7/206 . . . { [using down-hole drives](#) ( [down-hole drives per se](#) [E21B 4/00](#) ) }
- E21B 7/208 . . { [using down-hole drives](#) ( [down-hole drives per se](#) [E21B 4/00](#); [E21B 7/203](#) and [E21B 7/206](#) take precedence ) }
  
- E21B 7/24 . Drilling using vibrating or oscillating means, e.g. out-of-balance masses ( [percussion drilling](#) [E21B 1/00](#) )
  
- E21B 7/26 . Drilling without earth removal, e.g. with self-propelled burrowing devices ( { [E21B 7/205](#) and } [E21B 7/30](#) take precedence; [down-hole drives](#) [E21B 4/00](#), { e.g. [self-propelled fluid-operated hammers](#) [E21B 4/145](#) } )
- E21B 7/265 . . { [Combined with earth removal](#) }
  
- E21B 7/28 . Enlarging drilled holes, e.g. by counterboring ( [drill bits for enlarging the borehole](#) [E21B 10/26](#) )
- E21B 7/30 . . without earth removal

**Guidance heading: Drilling tools**

- E21B 10/00** **Drill bits** ( [specially adapted for deflecting the direction of boring](#) [E21B 7/064](#); with means for collecting substances [E21B 27/00](#) )

- E21B 10/003 . { with cutting edges facing in opposite axial directions }
- E21B 10/006 . { providing a cutting edge which is self-renewable during drilling }
- E21B 10/02 . Core bits ( characterised by wear resisting parts [E21B 10/46](#); obtaining undisturbed cores [E21B 25/00](#) )
- E21B 10/04 . . with core destroying means
- E21B 10/06 . . Roller core bits
- E21B 10/08 . Roller bits ( roller core bits [E21B 10/06](#); with leading portion [E21B 10/26](#); characterised by wear resisting parts [E21B 10/46](#) )
- E21B 10/083 . . { with longitudinal axis, e.g. wobbling or nutating roller bit ( longitudinal axis roller reamers [E21B 10/30](#) ) }
- E21B 10/086 . . { with excentric movement }
- E21B 10/10 . . with roller axle supported at both ends ( with disc-cutters [E21B 10/12](#) )
- E21B 10/12 . . with discs cutters
- E21B 10/14 . . combined with non-rolling cutters other than of leading-portion type
- E21B 10/16 . . characterised by tooth form or arrangement
- E21B 10/18 . . characterised by conduits or nozzles for drilling fluids ( drilling fluid supply to the bearings [E21B 10/23](#) )
- E21B 10/20 . . characterised by detachable or adjustable parts, e.g. legs or axles ( cross axle roller bits [E21B 10/10](#) )
- E21B 10/22 . . characterised by bearing, lubrication or sealing details
- E21B 10/23 . . . with drilling fluid supply to the bearings
- E21B 10/24 . . . characterised by lubricating details
- E21B 10/246 . . . { with pumping means for feeding lubricant }
- E21B 10/25 . . . characterised by sealing details
- E21B 10/26 . Drill bits with leading portion, i.e. drill bits with a pilot cutter; Drill bits for enlarging the borehole, e.g. reamers ( percussion drill bits with leading portion [E21B 10/40](#); augers with leading portion [E21B 10/44](#) )
- E21B 10/28 . . with non-expansible roller cutters
- E21B 10/30 . . . Longitudinal axis roller reamers, e.g. reamer stabilisers
- E21B 10/32 . . with expansible cutting tools
- E21B 10/322 . . . { cutter shifted by fluid pressure ( [E21B 10/345](#) takes precedence ) }
- E21B 10/325 . . . { the cutter being shifted by a spring mechanism }
- E21B 10/327 . . . { the cutter being pivoted about a longitudinal axis ( [E21B 10/34](#) takes precedence ) }
- E21B 10/34 . . . of roller-cutter type
- E21B 10/345 . . . { cutter shifted by fluid pressure }
- E21B 10/36 . Percussion drill bits ( characterised by wear resisting parts [E21B 10/46](#) ) { with helical conveying portion [E21B 10/445](#) }
- E21B 10/38 . . characterised by conduits or nozzles for drilling fluids
- E21B 10/40 . . with leading portion
- E21B 10/42 . Rotary drag type drill bits with teeth, blades or like cutting elements, e.g. fork-type bits,

- fish tail bits ( characterised by wear resisting parts [E21B 10/54](#), by conduits or nozzles for drilling fluid [E21B 10/60](#), by detachable or adjustable parts [E21B 10/62](#) )
- [E21B 10/43](#) . . characterised by the arrangement of teeth or other cutting elements
- [E21B 10/44](#) . Bits with helical conveying portion, e.g. screw type bits; Augers with leading portion or with detachable parts ( { Rotary drag type drill bits [E21B 10/42](#) }; drilling rods with helical structure [E21B 17/22](#) )
- [E21B 10/445](#) . . { percussion type, e.g. for masonry ( percussion drill bits in general [E21B 10/36](#) ) }
- [E21B 10/46](#) . characterised by wear resisting parts, e.g. diamond inserts { ( drill bits with self-renewable cutting edge [E21B 10/006](#) ) }
- [E21B 10/48](#) . . the bit being of core type { ( saw cylinders having their cutting rim equipped with abrasive particles for drilling stone or glass [B28D 1/041](#) ) }
- [E21B 10/485](#) . . . { with inserts in form of chisels, blades or the like }
- [E21B 10/50](#) . . the bit being of roller type
- [E21B 10/52](#) . . . with chisel or button type inserts
- [E21B 10/54](#) . . the bit being of the rotary drag type, e.g. fork-type bits
- [E21B 10/55](#) . . . with preformed cutting elements { with blades having preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts }
- [E21B 10/56](#) . . Button type inserts ( [E21B 10/52](#) takes precedence )
- [E21B 10/567](#) . . . with preformed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- [E21B 10/5673](#) . . . . { having a non planar or non circular cutting face ( [E21B 10/571](#) takes precedence ) }
- [E21B 10/5676](#) . . . . { having a cutting face with different segments, e.g. mosaic-type inserts }
- [E21B 10/573](#) . . . . characterised by support details
- [E21B 10/5735](#) . . . . . { Interface between the substrate and the cutting element }
- [E21B 10/58](#) . . Chisel type inserts ( { [E21B 10/485](#), } [E21B 10/52](#), [E21B 10/54](#) take precedence )
- [E21B 10/60](#) . characterised by conduits or nozzles for drilling fluids ( for roller bits [E21B 10/18](#); for percussion drill bits [E21B 10/38](#); { mining picks with arrangement of fluid-spraying nozzles [E21C 35/187](#) } )
- [E21B 10/602](#) . . { the bit being a rotary drag type bit with blades }
- [E21B 10/605](#) . . { the bit being a core-bit }
- [E21B 10/61](#) . . characterised by the nozzle structure
- [E21B 10/62](#) . characterised by parts, e.g. cutting elements, which are detachable or adjustable ( [E21B 10/64](#) takes precedence; for roller bits [E21B 10/20](#); { for rotary drag type drill bits [E21B 10/42](#) }; for augers [E21B 10/44](#) )
- [E21B 10/627](#) . . with plural detachable cutting elements
- [E21B 10/633](#) . . . independently detachable
- [E21B 10/64](#) . characterised by the whole or part thereof being insertable into or removable from the borehole without withdrawing the drilling pipe ( retrievable core receivers [E21B 25/02](#) )
- [E21B 10/66](#) . . the cutting element movable through the drilling pipe and laterally shiftable
- [E21B 11/00](#) **Other drilling tools** { ( boring grabs [E21B 27/00](#) ) }

- E21B 11/005 . { Hand operated drilling tools }
- E21B 11/02 . Boring rams ( percussion drives used in the borehole [E21B 4/06](#); percussion drill bits [E21B 10/36](#) )
- E21B 11/06 . with driven cutting chains or similarly driven tools
- E21B 12/00** **Accessories for drilling tools** { ( connecting and disconnecting drill bit and drilling pipe [E21B 19/18](#); sharpening stone drill bits [B24B 3/33](#) ) }
- E21B 12/02 . Wear indicators
- E21B 12/04 . Drill bit protectors
- E21B 12/06 . Mechanical cleaning devices

**Guidance heading: Other equipment or details for drilling; Well equipment or well maintenance**

- E21B 15/00** **Derricks; Masts;** { Other supports ( drill rigs with movable understructures [E21B 7/02](#) ) }
- E21B 15/003 . { adapted to be moved on their substructure, e.g. with skidding means; adapted to drill a plurality of wells ( slant-hole rigs [E21B 15/04](#) ) }
- E21B 15/006 . { Means for anchoring the drilling machine to the ground }
- E21B 15/02 . specially adapted for underwater drilling ( [E21B 15/04](#) takes precedence; floating drilling platforms [B63B 35/44](#); drilling platforms on legs [E02B 17/00](#); { with skidding means [E21B 15/003](#) } )
- E21B 15/04 . specially adapted for directional drilling, e.g. slant hole rigs { ( with skidding means [E21B 15/003](#) ) }
- E21B 15/045 . . { Hydraulic, pneumatic or electric circuits for their positioning }
- E21B 17/00** **Drilling rods or pipes; Flexible drill strings; Kellies; Drill collars; Sucker rods;** { Cables }; **Casings; Tubings** ( rod couplings in general [F16D](#) ; tubes or tube couplings in general [F16L](#) )
- E21B 17/003 . { with electrically conducting or insulating means ( [E21B 17/028](#) and [E21B 17/023](#) take precedence ) }
- E21B 17/006 . { Accessories for drilling pipes, e.g. cleaners ( wear protectors [E21B 17/10](#); handling drilling pipes [E21B 19/00](#); thread protectors [B65D 59/00](#) ) }
- E21B 17/01 . Risers ( { connections between riser sections [E21B 17/085](#); supporting a riser from a drilling or production platform [E21B 19/004](#) }; riser connectors { on well heads } [E21B 33/038](#) )
- E21B 17/012 . . { with buoyancy elements ( [E21B 17/015](#) takes precedence ) }
- E21B 17/015 . . { Non-vertical risers, e.g. articulated or catenary-type }
- E21B 17/017 . . { Bend restrictors for limiting stress on risers }



- E21B 17/02 . Couplings; joints { Expandable couplings or joints [E21B 43/106](#) }
- E21B 17/021 .. { Devices for subsurface connecting or disconnecting by rotation ( connecting or disconnecting pipe couplings or joints [E21B 19/16](#); fishing tools for frozen rods, casings, ropes, bits or the like [E21B 31/00](#) ) }
- E21B 17/023 .. { Arrangements for connecting cables or wirelines to downhole devices }
- E21B 17/025 ... { Side entry subs }
- E21B 17/026 ... { Arrangements for fixing cables or wirelines to the outside of downhole devices ( protectors and centralisers for cables and control lines [E21B 17/10D](#) ) }
- E21B 17/028 .. { Electrical or electro-magnetic connections }
- E21B 17/03 .. between drilling rod or pipe and drill motor, e.g. between drilling rod and hammer
- E21B 17/04 .. between rod { or the like } and bit or between rod and rod { or the like }
- E21B 17/042 ... threaded { ( readily releasing joints [E21B 17/06](#) ) }
- E21B 17/0423 .... { with plural threaded sections, e.g. with two-step threads }
- E21B 17/0426 .... { with a threaded cylindrical portion, e.g. for percussion rods }
- E21B 17/043 .... with locking means
- E21B 17/046 ... with ribs, pins or jaws, and complementary grooves or the like, e.g. bayonet catches
- E21B 17/05 ... Swivel joints
- E21B 17/06 ... Releasing-joints, e.g. safety joints
- E21B 17/07 ... Telescoping joints for varying drill string lengths; Shock absorbers ( heave compensators in the derrick [E21B 19/09](#); releasing-jars [E21B 31/107](#); { shock-absorbers in general [F16F](#) } )
- E21B 17/073 .... { with axial rotation }
- E21B 17/076 .... { between rod or pipe and drill bit }
- E21B 17/08 .. Casing joints
- E21B 17/085 ... { Riser connections ( connectors for wellhead [E21B 33/038](#) ) }
- E21B 17/10 . Wear protectors; Centralising devices, { e.g. stabilisers } ( drives used in the borehole with anchoring means [E21B 4/18](#); guiding or centralising devices outside the borehole [E21B 19/24](#) )
- E21B 17/1007 .. { for the internal surface of a pipe, e.g. wear bushings for underwater well-heads }
- E21B 17/1014 .. { Flexible or expansible centering means, e.g. with pistons pressing against the wall of the well ( [E21B 17/1042](#) takes precedence ) }
- E21B 17/1021 ... { with articulated arms or arcuate springs ( measuring the diameter [E21B 47/08](#) ) }
- E21B 17/1028 .... { with arcuate springs only, e.g. baskets with outwardly bowed strips for cementing operations }
- E21B 17/1035 .. { for plural rods, pipes or lines, e.g. for control lines }
- E21B 17/1042 .. { Elastomer protector or centering means }
- E21B 17/105 ... { split type }
- E21B 17/1057 .. { Centralising devices with rollers or with a relatively rotating sleeve ( [E21B 17/1014](#) takes precedence ) }
- E21B 17/1064 ... { Pipes or rods with a relatively rotating sleeve }
- E21B 17/1071 .. { specially adapted for pump rods, e.g. sucker rods }
- E21B 17/1078 .. { Stabilisers or centralisers for casing, tubing or drill pipes ( devices for off-center positioning [E21B 17/10](#); [E21B 17/1007](#) to [E21B 17/1064](#) take precedence ) }



- E21B 17/1085 . . { Wear protectors; Blast joints; Hard facing ( wear protection included in centralising devices, see relevant subgroups ) }
- E21B 17/1092 . . { Gauge section of drill bits }
- E21B 17/12 . . Devices for placing or drawing out wear protectors
- E21B 17/14 . Casing shoes { for the protection of the bottom of the casing }
- E21B 17/16 . Drill collars
- E21B 17/18 . Pipes provided with plural fluid passages ( { E21B 17/203 takes precedence; } circulation of drilling fluid by means of such pipes E21B 21/12; { general F16L 39/00 } )
- E21B 17/20 . Flexible or articulated drilling pipes, { e.g. flexible or articulated rods, pipes or cables ( risers E21B 17/01; swivel joints E21B 17/05 ) }
- E21B 17/203 . . { with plural fluid passages }
- E21B 17/206 . . { with conductors, e.g. electrical, optical ( hoses with electrically conducting means in general F16L 11/127 ) }
- E21B 17/22 . Rods or pipes with helical structure ( drill bits with helical conveying portion E21B 10/44 )
- E21B 19/00** **Handling rods, casings, tubes or the like outside the borehole, e.g. in the derrick ( surface drives E21B 1/02, E21B 3/02 )**
- E21B 19/002 . { specially adapted for underwater drilling ( E21B 19/09, E21B 19/143 take precedence; risers with buoyancy elements E21B 17/012, E21B 17/015 ) }
- E21B 19/004 . . { supporting a riser from a drilling or production platform }
- E21B 19/006 . . . { including heave compensators }
- E21B 19/008 . { Winding units, specially adapted for drilling operations ( capstans, winches B66D ; cathead actuated pipe wrenches or spinners E21B 19/162 ) }
- E21B 19/02 . Rod or cable suspensions ( load-engaging elements for hoisting or lowering purposes in general B66C 1/00; Crown blocks or pulley blocks B66D ; cable guides B66D 1/36 )
- E21B 19/04 . . Hooks
- E21B 19/06 . . Elevators, i.e. rod or tube gripping devices
- E21B 19/07 . . . Slip-type elevators ( slips E21B 19/10 )
- E21B 19/08 . Apparatus for feeding the rods or cables ( E21B 19/22 takes precedence; automatic feed E21B 44/02; hoisting drums B66D ); Apparatus for increasing or decreasing the pressure on the drilling tool; Apparatus for counterbalancing the weight of the rods
- E21B 19/081 . . Screw-and-nut feed mechanisms
- E21B 19/083 . . Cam, rack or like feed mechanisms
- E21B 19/084 . . with flexible drawing means, e.g. cables
- E21B 19/086 . . with a fluid-actuated cylinder ( E21B 19/084, E21B 19/087, E21B 19/09 take precedence )
- E21B 19/087 . . by means of a swinging arm
- E21B 19/089 . . with a spring or an additional weight
- E21B 19/09 . . specially adapted for drilling underwater formations from a floating support using

heave compensators supporting the drill string ( [drilling-pipe telescoping joints E21B 17/07](#); { [heave compensators for supporting a riser E21B 19/006](#) } )

- E21B 19/10 . Slips; Spiders; { [Catching devices \( rotary tables with master bushing or kelly bushing E21B 3/04](#); [slip-type elevators E21B 19/07](#); [casing heads with slips E21B 33/0422](#) ) }
- E21B 19/12 . Rope clamps ( [rope clamps in general F16G 11/00](#) ) { [rod, casings or tube clamps not secured to elevators](#) }
- E21B 19/14 . Racks, ramps, troughs or bins, for holding the lengths of rod singly or connected; Handling between storage place and borehole ( [E21B 19/20](#), [E21B 19/22](#) take precedence; { [storing elongated articles in general B65G 1/0442](#) } )
- E21B 19/143 . . { [specially adapted for underwater drilling](#) }
- E21B 19/146 . . { [Carousel systems, i.e. rotating rack systems](#) }
- E21B 19/15 . . Racking of rods in horizontal position; Handling between horizontal and vertical position
- E21B 19/155 . . . { [Handling between horizontal and vertical position](#) }
- E21B 19/16 . Connecting or disconnecting pipe couplings or joints ( [E21B 19/20](#) takes precedence; [Pipe wrenches or the like B25B](#) )
- E21B 19/161 . . { [using a wrench or a spinner adapted to engage a circular section of pipe \( E21B 19/168 takes precedence \)](#) }
- E21B 19/162 . . . { [cathead actuated](#) }
- E21B 19/163 . . . { [piston-cylinder actuated](#) }
- E21B 19/164 . . . { [motor actuated \( E21B 19/162 and E21B 19/163 take precedence \)](#) }
- E21B 19/165 . . { [Control or monitoring arrangements therefor](#) }
- E21B 19/166 . . . { [Arrangements of torque limiters or torque indicators](#) }
- E21B 19/167 . . { [using a wrench adapted to engage a non circular section of pipe, e.g. a section with flats or splines](#) }
- E21B 19/168 . . { [using a spinner with rollers or a belt adapted to engage a well pipe](#) }
- E21B 19/18 . Connecting or disconnecting drill bit and drilling pipe
- E21B 19/20 . Combined feeding from rack and connecting, e.g. automatically
- E21B 19/22 . Handling reeled pipe or rod units, e.g. flexible drilling pipes { ( [lifting or hauling appliances using two or more cooperating endless chains B66D 3/003](#) ) }
- E21B 19/24 . Guiding or centralising devices for drilling rods or pipes
- E21B 21/00** **Methods or apparatus for flushing boreholes, e.g. by use of exhaust air from motor** ( [freeing objects stuck in boreholes by flushing E21B 31/03](#); [well drilling compositions C09K 8/02](#) )
- E21B 21/001 . { [specially adapted for underwater drilling](#) }
- E21B 21/002 . { [Down-hole drilling fluid separation systems \( containers comprising collecting means with a strainer E21B 27/005](#); [subsoil filtering E21B 43/02](#); [down-hole production separators E21B 43/38](#) ) }
- E21B 21/003 . { [Means for stopping loss of drilling fluid \( plastering the borehole wall E21B 33/138](#) ) }

- E21B 21/01 . Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes ( { [swivel joints in hose-lines E21B 21/02](#); } [arrangements for treating drilling fluids E21B 21/06](#); { [waste disposal systems E21B 41/005](#) } )
- E21B 21/012 . . { [using exhaust air from the drilling motor for blowing off the dust at the borehole entrance](#) }
- E21B 21/015 . . Means engaging the bore entrance, e.g. hoods for collecting dust
- E21B 21/02 . Swivel joints in hose-lines { ( [hose connections in general F16L 31/00, F16L 33/00](#) ) }
- E21B 21/06 . Arrangements for treating drilling fluids outside the borehole ( [treating steps per se, see the relevant subclasses](#) )
- E21B 21/062 . . { [by mixing components](#) }
- E21B 21/063 . . { [by separating components](#) }
- E21B 21/065 . . . { [Separating solids from drilling fluids](#) }
- E21B 21/066 . . . . { [with further treatment of the solids, e.g. for disposal](#) }
- E21B 21/067 . . . { [Separating gases from drilling fluids](#) }
- E21B 21/068 . . { [using chemical treatment](#) }
- E21B 21/07 . . for treating dust-laden gaseous fluids
- E21B 21/08 . Controlling or monitoring pressure or flow of drilling fluid, e.g. automatic filling of boreholes, automatic control of bottom pressure ( [valve arrangements therefor E21B 21/10](#) )
- E21B 21/10 . Valve arrangements in drilling fluid circulation systems ( [valves in general F16K](#) )
- E21B 21/103 . . { [Down-hole by-pass valve arrangements, i.e. between the inside of the drill string and the annulus](#) }
- E21B 21/106 . . { [Valve arrangements outside the borehole, e.g. kelly valves](#) }
- E21B 21/12 . using drilling pipes with plural fluid passages, e.g. closed circulation systems ( [pipes with plural fluid passages E21B 17/18](#) )
- E21B 21/14 . using liquids and gases, e.g. foams
- E21B 21/16 . using gaseous fluids ( [E21B 21/14 takes precedence](#); [arrangements for handling drilling fluids outside the borehole E21B 21/01](#); [arrangements for treating drilling fluids E21B 21/06](#) )
- E21B 21/18 . Preventing exhaust air from the drill motor from blowing-off towards the working face
- E21B 23/00** **Apparatus for displacing, setting, locking, releasing, or removing tools, packers or the like in the boreholes or wells ( [setting of casings, screens or liners E21B 43/10](#) )**
- E21B 23/002 . { [Tool diverters, e.g. for through-the-flow line tool systems or for wire-line tools \( \[E21B 23/03 takes precedence\]\(#\); for drilling \[E21B 7/06\]\(#\) \)](#) }
- E21B 23/004 . { [Indexing systems for guiding relative movement between telescoping parts of downhole tools](#) }
- E21B 23/006 . . { ["J-slot" systems, i.e. lug and slot indexing mechanisms](#) }
- E21B 23/01 . for anchoring the tools or the like ( [E21B 23/02 to E21B 23/06 take precedence](#);

anchoring of drives in the borehole [E21B 4/18](#); { [packers E21B 33/12](#) } )

- E21B 23/02
  - . for locking the tools or the like in landing nipples or in recesses between adjacent sections of tubing ( [E21B 23/03](#) to [E21B 23/06](#) take precedence )
- E21B 23/03
  - . for setting the tools into, or removing the tools from, laterally offset landing nipples or pockets
- E21B 23/04
  - . operated by fluid means, e.g. actuated by explosion ( [E21B 23/06](#), [E21B 23/08](#) take precedence )
- E21B 23/06
  - . for setting packers
- E21B 23/065
  - .. { [setting tool actuated by explosion or gas generating means](#) }
- E21B 23/08
  - . Introducing or running tools by fluid pressure, e.g. through-the-flow-line tool systems ( { [tool diverters E21B 23/002](#) }; [special provisions on heads therefor E21B 33/068](#); [cementing plugs E21B 33/16](#); [scrapers operated by fluid pressure E21B 37/04](#) )
- E21B 23/10
  - .. Tools specially adapted therefor
- E21B 23/14
  - . for displacing a cable or cable-operated tool, e.g. for logging or perforating operations in deviated wells ( { [side entry sub E21B 17/02D](#); [control line protectors E21B 17/1035](#) }; by fluid pressure [E21B 23/08](#); [provision on well heads for introducing or removing cable-operated tools E21B 33/072](#), [E21B 33/076](#) )
- E21B 25/00**

**Apparatus for obtaining or removing undisturbed cores, e.g. core barrels, core extractors ( [core bits E21B 10/02](#); [using explosives or projectiles in boreholes E21B 49/04](#); [side-wall sampling or coring E21B 49/06](#) )**
- E21B 25/005
  - . { [Above ground means for handling the core, e.g. for extracting the core from the core barrel](#) }
- E21B 25/02
  - . the core receiver being insertable into, or removable from, the borehole without withdrawing the drilling pipe ( [retrievable drill bits E21B 10/64](#) )
- E21B 25/04
  - .. the core receiver having a core forming cutting edge or element, e.g. punch type core barrels
- E21B 25/06
  - . the core receiver having a flexible liner or inflatable retaining means
- E21B 25/08
  - . Coating, freezing, consolidating cores ( [E21B 25/06](#) takes precedence ); Recovering uncontaminated cores or cores at formation pressure
- E21B 25/10
  - . Formed core retaining or severing means ( [E21B 25/06](#), [E21B 25/08](#) take precedence )
- E21B 25/12
  - .. of the sliding wedge type
- E21B 25/14
  - .. mounted on pivot transverse to core axis
- E21B 25/16
  - . for obtaining oriented cores
- E21B 25/18
  - . the core receiver being specially adapted for operation under water

**E21B 27/00** **Containers for collecting or depositing substances in boreholes or wells, e.g. bailers, { [baskets or buckets](#) } for collecting mud or sand; Drill bits with means for**

**collecting substances, e.g. valve drill bits**

- E21B 27/005 . { Collecting means with a strainer }
- E21B 27/02 . Dump bailers, i.e. containers for depositing substances, e.g. cement or acids
- E21B 27/04 . where the collecting or depositing means including helical conveying means { drilling with helical conveying means combined with bucket-type container [E21B 7/006](#) }

**E21B 28/00** **Vibration generating arrangements for boreholes or wells, e.g. for stimulating production** ( for drilling [E21B 7/24](#); { for fishing for or freeing objects [E21B 31/005](#) }; for transmitting measuring-signals [E21B 47/14](#); for geophysical measurements [G01V 1/02](#) )

**WARNING**

Group [E21B 28/00](#) is not complete. See also [E21B 43/003](#)

**E21B 29/00** **Cutting or destroying pipes, packers, plugs, or wire lines, located in boreholes or wells, e.g. cutting of damaged pipes, of windows ( perforators [E21B 43/11](#) ); Deforming of pipes in boreholes or wells; Reconditioning of well casings while in the ground { ( by enlarging drilled holes or counterboring [E21B 7/28](#) ) }**

- E21B 29/002 . { Cutting, e.g. milling, a pipe with a cutter rotating along the circumference of the pipe }
- E21B 29/005 . . { with a radially-expansible cutter rotating inside the pipe, e.g. for cutting an annular window }
- E21B 29/007 . . { with a radially-retracting cutter rotating outside the pipe }
- E21B 29/02 . by explosives or by thermal or chemical means ( { freeing stuck objects by explosives [E21B 31/002](#) }; destroying objects in boreholes or wells by explosives [E21B 31/16](#) )
- E21B 29/04 . Cutting of wire lines or the like ( [E21B 29/02](#) takes precedence )
- E21B 29/06 . Cutting windows, e.g. directional window cutters for whipstock operations ( { [E21B 29/005](#) and } [E21B 29/08](#) take precedence { ( whipstocks [E21B 7/061](#) ) } )
- E21B 29/08 . Cutting or deforming pipes to control fluid flow ( shear type blow-out preventers [E21B 33/063](#) )
- E21B 29/10 . Reconditioning of well casings, e.g. straightening
- E21B 29/12 . specially adapted for underwater installations ( [E21B 29/08](#) takes precedence )

**E21B 31/00** **Fishing for or freeing objects in boreholes or wells** ( { using junk baskets or the like [E21B 27/00](#) }; provisions on well heads for introducing or removing objects [E21B 33/068](#); Locating or determining the position of objects in boreholes or wells [E21B 47/09](#) )

- E21B 31/002 . { Destroying the objects to be fished, e.g. by explosive means ( cutting by explosives [E21B 29/02](#) ) }
- E21B 31/005 . { using vibrating or oscillating means ( vibration generating arrangements for

- boreholes or wells [E21B 28/00](#) ) }
- E21B 31/007 . { fishing tools with means for attaching comprising fusing or sticking }
- E21B 31/03 . Freeing by flushing; { Controlling differential pipe sticking }
- E21B 31/06 . using magnetic means
- E21B 31/107 . using impact means for releasing stuck parts, e.g. jars ( [telescoping joints E21B 17/07](#) )
- E21B 31/1075 . . { using explosives }
- E21B 31/113 . . hydraulically-operated
- E21B 31/1135 . . . { Jars with a hydraulic impedance mechanism, i.e. a restriction, for initially delaying escape of a restraining fluid }
- E21B 31/12 . Grappling tools, e.g. tongs or grabs
- E21B 31/125 . . { specially adapted for parted wire line or ropes }
- E21B 31/14 . . with means deflecting the direction of the tool, e.g. by use of knuckle joints ( [apparatus for deflecting the boring E21B 7/06](#) )
- E21B 31/16 . . combined with cutting or destroying means ( [cutting or destroying means per se E21B 29/00](#) )
- E21B 31/18 . . gripping externally, e.g. overshot
- E21B 31/20 . . gripping internally, e.g. fishing spears
- E21B 33/00      Sealing or packing boreholes or wells**
- E21B 33/02 . Surface sealing or packing
- E21B 33/03 . . Well heads; Setting-up thereof ( [valve arrangements therefor E21B 34/02](#) )
- E21B 33/035 . . . specially adapted for underwater installations ( [E21B 33/043](#), [E21B 33/064](#), [E21B 33/076](#) take precedence )
- E21B 33/0355 . . . . { Control systems, e.g. hydraulic, pneumatic, electric, acoustic, for submerged well heads }
- E21B 33/037 . . . . Protective housing therefor
- E21B 33/0375 . . . . . { Corrosion protection means ( in general [C23F](#) ) }
- E21B 33/038 . . . . Connectors used on well heads, e.g. for connecting blow-out preventer and riser ( [connecting a production flow-line to an underwater well head E21B 43/013](#) )
- E21B 33/0385 . . . . . { [electrical connectors](#) ( [underwater electrical connections in general H01R 13/523](#) ) }
- E21B 33/04 . . . Casing heads; Suspending casings or tubings in well heads ( [setting of casings in wells E21B 43/10](#) )
- E21B 33/0407 . . . . { with a suspended electrical cable }
- E21B 33/0415 . . . . { rotating or floating support for tubing or casing hanger }
- E21B 33/0422 . . . . { a suspended tubing or casing being gripped by a slip or an internally serrated member ( [slips in rotary table E21B 19/10](#) ) }
- E21B 33/043 . . . . specially adapted for underwater well heads ( { [E21B 33/0407](#), } [E21B 33/047](#) take precedence )

E21B 33/047	....	for plural tubing strings
E21B 33/05	....	Cementing-heads, e.g. having provision for introducing cementing plugs
E21B 33/06	...	Blow-out preventers, { i.e. apparatus closing around a drill pipe, e.g. annular blow-out preventers ( rotating blow-out preventers <a href="#">E21B 33/085</a> ; valves <a href="#">E21B 34/00</a> ) }
E21B 33/061	....	{ Ram-type blow-out preventers, e.g. with pivoting rams }
E21B 33/062	.....	{ with sliding rams }
E21B 33/063	.....	{ for shearing drill pipes ( cutting of wireline <a href="#">E21B 29/04</a> ; cutting pipes <a href="#">E21B 29/08</a> ) }
E21B 33/064	....	specially adapted for underwater well heads ( connectors therefor <a href="#">E21B 33/038</a> ; { control systems for submerged well-heads <a href="#">E21B 33/0355</a> } )
E21B 33/068	...	having provision for introducing objects or fluids into, or removing objects from, wells ( cementing heads <a href="#">E21B 33/05</a> ; { wipers, oil savers <a href="#">E21B 33/08</a> } )
E21B 33/072	....	for cable-operated tools ( <a href="#">E21B 33/076</a> takes precedence )
E21B 33/076	....	specially adapted for underwater installations
E21B 33/08	..	Wipers; Oil savers
E21B 33/085	...	{ Rotatable packing means, e.g. rotating blow-out preventers }
E21B 33/10	.	in the borehole { sealing the junction between main bore and laterals <a href="#">E21B 41/0042</a> }
E21B 33/12	..	Packers; Plugs ( { locking packers or plugs in landing nipples <a href="#">E21B 23/02</a> }; used for cementing <a href="#">E21B 33/134</a> , <a href="#">E21B 33/16</a> )
E21B 33/1204	...	{ permanent; drillable }
E21B 33/1208	...	{ characterised by the construction of the sealing or packing means ( <a href="#">E21B 33/1277</a> takes precedence ) }
E21B 33/1212	....	{ including a metal-to-metal seal element }
E21B 33/1216	....	{ Anti-extrusion means, e.g. means to prevent cold flow of rubber packing }
E21B 33/122	...	Multiple string packers
E21B 33/124	...	Units with longitudinally-spaced plugs for isolating the intermediate space
E21B 33/1243	....	{ with inflatable sleeves }
E21B 33/1246	.....	{ inflated by down-hole pumping means operated by a pipe string }
E21B 33/126	...	with fluid-pressure-operated elastic cup or skirt ( <a href="#">E21B 33/122</a> , <a href="#">E21B 33/124</a> take precedence )
E21B 33/1265	....	{ with mechanical slips }
E21B 33/127	...	with inflatable sleeve ( <a href="#">E21B 33/122</a> , <a href="#">E21B 33/124</a> take precedence )
E21B 33/1272	....	{ inflated by down-hole pumping means operated by a pipe string }
E21B 33/1275	....	{ inflated by down-hole pumping means operated by a down-hole drive }
E21B 33/1277	....	{ characterised by the construction or fixation of the sleeve }
E21B 33/128	...	with a member expanded radially by axial pressure ( <a href="#">E21B 33/122</a> , <a href="#">E21B 33/124</a> , { <a href="#">E21B 33/129</a> } take precedence; { characterised by the construction of the sealing means <a href="#">E21B 33/1208</a> } )
E21B 33/1285	....	{ by fluid pressure }
E21B 33/129	...	with mechanical slips for hooking into the casing ( <a href="#">E21B 33/122</a> , <a href="#">E21B 33/124</a> take precedence )
E21B 33/1291	....	{ anchor set by wedge or cam in combination with frictional effect, using so-called drag-blocks ( <a href="#">E21B 33/1295</a> takes precedence ) }
E21B 33/1292	.....	{ with means for anchoring against downward and upward movement }



- E21B 33/1293 . . . . { with means for anchoring against downward and upward movement ( [E21B 33/1291](#), [E21B 33/1295](#) take precedence ) }
- E21B 33/1294 . . . . { characterised by a valve, e.g. a by-pass valve }
- E21B 33/1295 . . . . actuated by fluid pressure
- E21B 33/12955 . . . . . { using drag blocks frictionally engaging the inner wall of the well }
- E21B 33/13 . . . Methods or devices for cementing, for plugging holes, crevices, or the like ( [dump bailers E21B 27/02](#); { methods or apparatus for grouting offshore structures [E02B 17/0008](#) } chemical compositions therefor [C09K 8/00](#) ) }
- E21B 33/134 . . . Bridging plugs { ( [packers E21B 33/12](#) ) }
- E21B 33/136 . . . Baskets, e.g. of umbrella type
- E21B 33/138 . . . Plastering the borehole wall; Injecting into the formations { ( [packers E21B 33/12](#); consolidation of loose sand or the like round the wells without excessively decreasing the permeability thereof [E21B 43/02B](#), compositions therefor [C09K 8/56](#) ) }
- E21B 33/14 . . . for cementing casings into boreholes { ( using special cement compositions [E21B 33/13B](#); control of cementation quality or level [E21B 47/0005](#) ) }
- E21B 33/143 . . . . { for underwater installations }
- E21B 33/146 . . . . { Stage cementing, i.e. discharging cement from casing at different levels }
- E21B 33/16 . . . . using plugs for isolating cement charge; Plugs therefor { ( [spacer compositions E21B 33/13B5](#); stage cementing [E21B 33/146](#) ) }
  
- E21B 34/00** **Valve arrangements for boreholes or wells** ( in drilling fluid circulation systems [E21B 21/10](#); { tool diverters [E21B 23/002](#); } blow-out preventers [E21B 33/06](#); oil flow regulating apparatus [E21B 43/12](#); valves in general [F16K](#) )
  
- E21B 34/02 . . in well heads
- E21B 34/04 . . . in underwater well heads
- E21B 34/045 . . . { adapted to be lowered on a tubular string into position within a blow-out preventer stack, e.g. so-called test trees }
  
- E21B 34/06 . . in wells
- E21B 34/063 . . { Valve or closure with destructible element, e.g. frangible disc ( [E21B 34/103](#) takes precedence ) }
- E21B 34/066 . . { electrically actuated }
- E21B 34/08 . . responsive to flow or pressure of the fluid obtained ( [E21B 34/10](#) takes precedence )
- E21B 34/085 . . . { with time-delay systems, e.g. hydraulic impedance mechanisms }
- E21B 34/10 . . operated by control fluid supplied from above ground ( { by a dropped ball or piston [E21B 34/14](#); } above-ground control means [E21B 34/16](#) )
- E21B 34/101 . . . { with means for equalizing fluid pressure above and below the valve }
- E21B 34/102 . . . { with means for locking the closing element in open or closed position ( [E21B 34/105](#) and [E21B 34/108](#) take precedence ) }
- E21B 34/103 . . . . { with a shear pin }
- E21B 34/105 . . . { retrievable, e.g. wire line retrievable, i.e. with an element which can be landed into a landing-nipple provided with a passage for control fluid }
- E21B 34/106 . . . . { the retrievable element being a secondary control fluid actuated valve landed into the bore of a first inoperative control fluid actuated valve }
- E21B 34/107 . . . . { the retrievable element being an operating or controlling means retrievable

- separately from the closure member, e.g. pilot valve landed into a side pocket ( [E21B 34/106](#) takes precedence ) }
- [E21B 34/108](#) . . . { with time delay systems, e.g. hydraulic impedance mechanisms }
- [E21B 34/12](#) . . . operated by movement of casings or tubings
- [E21B 34/125](#) . . . { with time delay systems, e.g. hydraulic impedance mechanisms }
- [E21B 34/14](#) . . . operated by movement of tools, e.g. sleeve valves operated by pistons or wire line tools { ( [E21B 34/066](#) takes precedence ) }
- [E21B 34/16](#) . Above-ground control means therefor { ( control systems for submerged well heads [E21B 33/0355](#) ) }
- [E21B 35/00](#) Methods or apparatus for preventing or extinguishing fires** ( cutting or deforming pipes to control fluid flow [E21B 29/08](#); controlling flow of fluid to or in wells [E21B 43/12](#); fire fighting in general [A62C](#) , [A62D](#) )
- [E21B 36/00](#) Heating, cooling, insulating arrangements for boreholes or wells, e.g. for use in permafrost zones** ( drilling by use of heat [E21B 7/14](#); secondary recovery methods using heat [E21B 43/24](#) )
- [E21B 36/001](#) . { Cooling arrangements }
- [E21B 36/003](#) . { Insulating arrangements }
- [E21B 36/005](#) . { Heater surrounding production tube }
- [E21B 36/006](#) . { Combined heating and pumping means }
- [E21B 36/008](#) . { using chemical heat generating means }
- [E21B 36/02](#) . using burners
- [E21B 36/025](#) . . { the burners being above ground or outside the bore hole }
- [E21B 36/04](#) . using electrical heaters
- [E21B 37/00](#) Methods or apparatus for cleaning boreholes or wells** ( [E21B 21/00](#) takes precedence; { bailers [E21B 27/00](#); } cleaning pipes in general [B08B 9/02](#) )
- [E21B 37/02](#) . Scrapers specially adapted therefor
- [E21B 37/04](#) . . . operated by fluid pressure, e.g. free-piston scrapers ( operating other tools by fluid pressure [E21B 23/08](#) )
- [E21B 37/045](#) . . . { Free-piston scrapers }
- [E21B 37/06](#) . using chemical means for preventing, limiting { or eliminating } the deposition of paraffins or like substances ( chemical compositions therefor [C09K 8/52](#) )
- [E21B 37/08](#) . cleaning in situ of down-hole filters, screens, { e.g. casing perforations, } or gravel packs ( [E21B 37/06](#) takes precedence )
- [E21B 37/10](#) . Well swabs { ( pistons in general [F16J](#) ) }

- E21B 40/00**      **Tubing catchers, automatically arresting the fall of oil-well tubing { ( preventing small objects from falling into the borehole [E21B 41/0021](#) ) }**
- E21B 41/00**      **Equipment or details not covered by groups [E21B 15/00](#) to [E21B 40/00](#)**
- [E21B 41/0007](#)      . { for underwater installations ( [E21B 41/005](#), [E21B 41/04](#), [E21B 41/06](#), [E21B 41/08](#), [E21B 41/10](#) take precedence ) }
- [E21B 41/0014](#)      . . { Underwater well locating or reentry systems }
- [E21B 41/0021](#)      . { Safety devices, e.g. for preventing small objects from falling into the borehole }
- [E21B 41/0035](#)      . { Apparatus or methods for multilateral well technology, e.g. for the completion of or workover on wells with one or more lateral branches ( whipstocks [E21B 7/061](#); tool diverters [E21B 23/002](#); cutting casing windows [E21B 29/06](#); specific well pattern [E21B 43/30](#) ) }
- [E21B 41/0042](#)      . . { characterised by sealing the junction between a lateral and a main bore }
- [E21B 41/005](#)      . { Waste disposal systems ( treatment of drilling fluid outside the borehole [E21B 21/06](#); collecting oil or the like from a submerged leakage [E21B 43/0122](#) ) }
- [E21B 41/0057](#)      . . { Disposal of a fluid by injection into a subterranean formation }
- [E21B 41/0064](#)      . . . { Carbon dioxide sequestration ( storing fluids in porous layers [B65G 5/005](#) ) }
- [E21B 41/0071](#)      . . { Adaptation of flares, e.g. arrangements of flares in offshore installations ( flares of waste gases or noxious gases [F23G 7/08](#) ) }
- [E21B 41/0078](#)      . { Nozzles used in boreholes ( drilling by liquid or gas jets [E21B 7/18](#); drill bits with nozzles [E21B 10/60](#); perforators using direct fluid action [E21B 43/114](#); obtaining a slurry of minerals using nozzles [E21B 43/29](#); nozzles in general [B05B](#) ) }
- [E21B 41/0085](#)      . { Adaptations of electric power generating means for use in boreholes ( generation of electric power per se [H02](#) ) }
- [E21B 41/0092](#)      . { Methods relating to program engineering, design or optimisation }
- [E21B 41/02](#)      . in situ inhibition of corrosion in boreholes or wells ( dump bailers [E21B 27/02](#); chemical compositions therefor [C09K 8/54](#); inhibiting corrosion in general [C23F](#) )
- [E21B 41/04](#)      . Manipulators for underwater operations, e.g. temporarily connected to well heads ( manipulators in general [B25J](#) )
- [E21B 41/06](#)      . Work chambers for underwater operations, e.g. temporarily connected to well heads ( in general [B63C 11/00](#) )
- [E21B 41/08](#)      . Underwater guide bases, e.g. drilling templates; Levelling therefor
- WARNING**
- This group was introduced in January 2000. Patent documents are continuously being reclassified to this group from groups [E21B 7/12](#), [E21B 33/035](#), [E21B 43/017](#)
- [E21B 41/10](#)      . Guide posts, e.g. releasable; Attaching guide lines to underwater guide bases

**Guidance heading: Obtaining fluids from wells**

- E21B 43/00**      **Methods or apparatus for obtaining oil, gas, water, soluble or meltable materials or a slurry of minerals from wells ( applicable only to water [E03B](#) ; obtaining oil-bearing deposits or soluble or meltable materials by mining techniques [E21C 41/00](#); pumps [F04](#) )**
- [E21B 43/003](#)      . { [Vibrating earth formations](#) ( vibration generating arrangements for boreholes or wells [E21B 28/00](#) ) }
- [E21B 43/006](#)      . { [Production of coal-bed methane](#) ( [E21B 43/243](#) takes precedence; methods or devices for drawing-off gases for safety purposes in mines [E21F 7/00](#) ) }
- [E21B 43/01](#)      . specially adapted for obtaining from underwater installations ( [underwater well heads](#) [E21B 33/035](#) )
- [E21B 43/0107](#)      .. { [Connecting of flow lines to offshore structures](#) ( [E21B 43/013](#) takes precedence ) }
- [E21B 43/0122](#)      .. { [Collecting oil or the like from a submerged leakage](#) ( cleaning or keeping clear the surface of open water from oil or the like [E02B 15/04](#) ) }
- [E21B 43/013](#)      .. connecting a production flow line to an underwater well head
- [E21B 43/0135](#)      ... { using a pulling cable }
- [E21B 43/017](#)      .. Production satellite stations, i.e. underwater installations comprising a plurality of satellite well heads connected to a central station ( [underwater separating arrangements](#) [E21B 43/36](#) )
- [E21B 43/02](#)      . Subsoil filtering ( [E21B 43/11](#) TAKES precedence, chemical compositions for consolidating loose sand or the like around wells [C09K 8/56](#) )
- [E21B 43/025](#)      .. { [Consolidation of loose sand or the like round the wells without excessively decreasing the permeability thereof](#) ( [sealing borehole walls](#) [E21B 33/138](#) ) }
- [E21B 43/04](#)      .. Graveling of wells
- [E21B 43/045](#)      ... { [Crossover tools](#) }
- [E21B 43/08](#)      .. Screens or liners { ( [expandable screens or liners](#) [E21B 43/108](#); obtaining drinking water; filters [E03B 3/18](#) ) }
- [E21B 43/082](#)      ... { [Screens comprising porous materials, e.g. prepacked screens](#) }
- [E21B 43/084](#)      ... { [Screens comprising woven materials, e.g. mesh or cloth](#) }
- [E21B 43/086](#)      ... { [Screens with preformed openings, e.g. slotted liners \( comprising porous materials](#) [E21B 43/082](#) ) }
- [E21B 43/088](#)      ... { [Wire screens \( comprising porous materials](#) [E21B 43/082](#); comprising woven materials [E21B 43/084](#) ) }
- [E21B 43/10](#)      .. Setting of casings, screens, liners { [or the like](#) } in wells ( [driving or forcing casings into boreholes, simultaneously drilling and casing boreholes](#) [E21B 7/20](#); setting of tools, packers or the like [E21B 23/00](#); suspending casings in well heads [E21B 33/04](#) )
- [E21B 43/101](#)      ... { [for underwater installations](#) }
- [E21B 43/103](#)      ... { [of expandable casings, screens, liners, or the like](#) }
- [E21B 43/105](#)      .... { [Expanding tools specially adapted therefor](#) }
- [E21B 43/106](#)      .... { [Couplings or joints therefor](#) }
- [E21B 43/108](#)      .... { [Expandable screens or liners](#) }

- E21B 43/11 . Perforators; Permeators
- E21B 43/112 . . Perforators with extendable perforating members, e.g. actuated by fluid means
- E21B 43/114 . . Perforators using direct fluid action { on the wall to be perforated }, e.g. abrasive jets
- E21B 43/116 . . Gun or shaped charge perforators { ( projectiles with shaped or hollow charge [F42B 12/10](#) ) }
- E21B 43/117 . . . Shaped charge perforators ( [E21B 43/118](#) takes precedence )
- E21B 43/118 . . . characterised by lowering in vertical position and subsequent tilting to operating position
- E21B 43/1185 . . . Ignition systems
- E21B 43/11852 . . . { hydraulically actuated }
- E21B 43/11855 . . . { mechanically actuated, e.g. by movement of a wireline or a drop-bar ( [E21B 43/11852](#) takes precedence ) }
- E21B 43/11857 . . . { firing indication systems }
- E21B 43/119 . . Details, e.g. for locating perforating place or direction
- E21B 43/1195 . . { Replacement of drilling mud; decrease of undesirable shock waves }
  
- E21B 43/12 . Methods or apparatus for controlling the flow of the obtained fluid to or in wells ( [E21B 43/25](#) takes precedence; valve arrangements [E21B 34/00](#) )
- E21B 43/121 . . { Lifting well fluids ( survey of down-hole pump systems [E21B 47/0007](#) ) }
- E21B 43/122 . . . { Gas lift }
- E21B 43/123 . . . { Gas lift valves }
- E21B 43/124 . . . { Adaptation of jet-pump systems }
- E21B 43/126 . . . { Adaptations of down-hole pump systems powered by drives outside the borehole, e.g. by a rotary or oscillating drive ( powered by fluid [E21B 43/129](#) ) }
- E21B 43/127 . . . { Adaptations of walking-beam pump systems }
- E21B 43/128 . . . { Adaptation of pump systems with down-hole electric drives }
- E21B 43/129 . . . { Adaptations of down-hole pump systems powered by fluid supplied from outside the borehole ( gas-lift [E21B 43/122](#); jet pumps [E21B 43/124](#) ) }
  
- E21B 43/14 . Obtaining from a multiple-zone well
  
- E21B 43/16 . Enhanced recovery methods for obtaining hydrocarbons ( fracturing [E21B 43/26](#); obtaining slurry [E21B 43/29](#); reclamation of contaminated soil in situ [B09C](#) ; { chemical compositions therefor [C09K 8/58](#) } )
- E21B 43/162 . . { Injecting fluid from longitudinally spaced locations in injection well }
- E21B 43/164 . . { Injecting CO<sub>2</sub> or carbonated water ( in combination with organic material [C09K 8/594](#) ) }
- E21B 43/166 . . { Injecting a gaseous medium; Injecting a gaseous medium and a liquid medium ( CO<sub>2</sub> injection [E21B 43/164](#); steam injection [E21B 43/24](#) ) }
- E21B 43/168 . . . { Injecting a gaseous medium }
- E21B 43/17 . . Interconnecting two or more wells by fracturing or otherwise attacking the formation ( { [E21B 43/2405](#), } [E21B 43/247](#) take precedence )
- E21B 43/18 . . Repressuring or vacuum methods
- E21B 43/20 . . Displacing by water
- E21B 43/24 . . using heat, e.g. steam injection ( heating, cooling or insulating wells [E21B 36/00](#) ) { ( in combination with organic material [E21B 43/22D](#) ) }

- E21B 43/2401 . . . { by means of electricity }
- E21B 43/2403 . . . { by means of nuclear energy ( [nuclear reactors G21](#) ) }
- E21B 43/2405 . . . { in association with fracturing or crevice forming processes ( [E21B 43/247 takes precedence](#) ) }
- E21B 43/2406 . . . { Steam assisted gravity drainage (SAGD) }
- E21B 43/2408 . . . . { SAGD in combination with other methods }

### **WARNING**

Not complete pending a reorganisation. See also [E21B 43/24](#) and subgroups

- E21B 43/241 . . . combined with solution mining of non-hydrocarbon minerals, e.g. solvent pyrolysis of oil shale
- E21B 43/243 . . . Combustion in situ
- E21B 43/247 . . . . in association with fracturing processes { or crevice forming processes }
- E21B 43/248 . . . . . using explosives
- E21B 43/25 . Methods for stimulating production ( [dump bailers E21B 27/02](#); vibration generating arrangements [E21B 28/00](#); by vibrating earth formations [E21B 43/00C](#) chemical compositions therefor [C09K 8/60](#) )
- E21B 43/255 . . { including the injection of a gaseous medium as treatment fluid into the formation }
- E21B 43/26 . . by forming crevices or fractures { ( [chemical compositions therefor C09K 8/62](#) ) }
- E21B 43/261 . . . { Separate steps of (1) cementing, plugging or consolidating and (2) fracturing or attacking the formation }
- E21B 43/263 . . . using explosives { ( [Combustion in situ using explosives E21B 43/248](#) ) }
- E21B 43/2635 . . . . { by means of nuclear energy ( peaceful applications of nuclear explosive devices in general [G21J 3/00](#) ) }
- E21B 43/267 . . . reinforcing fractures by propping { ( [chemical compositions therefor C09K 8/80](#) ) }
- E21B 43/28 . Dissolving minerals other than hydrocarbons, e.g. by an alkaline or acid leaching agent ( [E21B 43/241 takes precedence](#); { using steerable or laterally extendable nozzles [E21B 43/292](#) } )
- E21B 43/281 . . { using heat ( [heating, cooling or insulating wells E21B 36/00](#) ) }
- E21B 43/283 . . { in association with a fracturing process }
- E21B 43/285 . Melting minerals, e.g. sulfur ( [E21B 43/24 takes precedence](#); heating, cooling or insulating arrangements for wells [E21B 36/00](#) )
- E21B 43/29 . Obtaining a slurry of minerals, e.g. by using nozzles
- E21B 43/292 . . { using steerable or laterally extendable nozzles }
- E21B 43/295 . Gasification of minerals, e.g. for producing mixtures of combustible gases ( [E21B 43/243 takes precedence](#) )
- E21B 43/30 . Specific pattern of wells, e.g. optimizing the spacing of wells ( [production satellite stations E21B 43/017](#) )
- E21B 43/305 . . { comprising at least one inclined or horizontal well }
- E21B 43/32 . Preventing gas- or water- coning phenoma, i.e. the formation of a conical column of

gas or water around wells

- E21B 43/34 . Arrangements for separating materials produced by the well ( [separating apparatus per se](#), [see the relevant subclasses](#) )
- E21B 43/36 . . Underwater separating arrangements ( [E21B 43/38](#) takes precedence )
- E21B 43/38 . . in the well
- E21B 43/385 . . . { [by reinjecting the separated materials into an earth formation in the same well](#) }
- E21B 43/40 . . Separation associated with re-injection of separated materials { ( [E21B 43/385](#) takes precedence ) }

**Guidance heading:** Automatic control, surveying or testing

**E21B 44/00** **Automatic control systems specially adapted for drilling operations, i.e. self-operating systems which function to carry out or modify a drilling operation without intervention of a human operator, e.g. computer-controlled drilling systems** ( for non-automatic drilling control, [see the operation controlled; automatic feeding from rack and connecting of drilling pipes E21B 19/20](#); controlling pressure or flow of drilling fluid [E21B 21/08](#); control systems in general [G05](#) ); **Systems specially adapted for monitoring a plurality of drilling variables or conditions** ( means for transmitting measuring-signals from the well to the surface [E21B 47/12](#) )

- E21B 44/005 . { [Below-ground automatic control systems](#) }
- E21B 44/02 . Automatic control of the tool feed ( { [E21B 44/005](#) }, [E21B 44/10](#) take precedence )
- E21B 44/04 . . in response to the torque of the drive; { [Measuring drilling torque \( E21B 44/06 takes precedence; measuring stresses in a well bore pipe E21B 47/0006 \)](#) }
- E21B 44/06 . . in response to the flow or pressure of the motive fluid of the drive
- E21B 44/08 . . in response to the amplitude of the movement of the percussion tool, e.g. jump or recoil
- E21B 44/10 . Arrangements for automatic stopping when the tool is lifted from the working face { [informative reference: arrangements for automatic stopping for portable percussive tools B25D 9/265](#) }

**E21B 45/00** **Measuring the drilling time or rate of penetration**

**E21B 47/00** **Survey of boreholes or wells** ( [monitoring pressure or flow of drilling fluid E21B 21/08](#); [geophysical logging G01V](#) )

- E21B 47/0001 . { [for underwater installations](#) }
- E21B 47/0002 . { [Survey of boreholes or wells by visual inspection \( photographing internal surfaces, e.g. of pipes G03B 37/005, E21B57/A7B8; closed circuit television systems H04N 7/18 \)](#) }
- E21B 47/0003 . { [Determining well or borehole volumes \( determining depth E21B 47/04, diameter E21B 47/08; measuring volumes in general G01F \)](#) }
- E21B 47/0005 . { [control of cementation quality or level \( measuring temperature E21B 47/065 \)](#) }



- E21B 47/0006 . { Measuring stresses in a well bore pipe string or casing ( for locating stuck pipe [E21B 47/09](#) ) }
  - E21B 47/0007 . { Survey of down-hole pump systems }
  - E21B 47/0008 . . { Survey of walking-beam pump systems, e.g. for the detection of so called "pumped-off" conditions }
  - E21B 47/01 . Devices for supporting measuring instruments on a drill pipe, rod or wireline ( [setting or locking tools in boreholes or wells E21B 23/00](#) ); { ( [flexible centering means per se E21B 17/1014](#) ) } Protecting measuring instruments in boreholes against heat, shock, pressure or the like
- NOTE**
- Devices for both supporting and protecting measuring instruments are only classified in [E21B 47/011](#)
- E21B 47/011 . . { Protecting measuring instruments ( cooling or insulating arrangements for boreholes or wells [E21B 36/00](#) ) }
  - E21B 47/02 . Determining slope or direction ( [clinometers or direction meters G01C](#) )
  - E21B 47/022 . . of the borehole, { e.g. using geomagnetism }
  - E21B 47/02208 . . . { using seismic or acoustic means }
  - E21B 47/02216 . . . { using at least one source of electromagnetic energy and at least one detector therefor }
  - E21B 47/02224 . . . . { at least one of the sources or one of the detectors being located above ground }
  - E21B 47/02232 . . . { using a pendulum }
  - E21B 47/024 . . of devices in the borehole ( [E21B 47/022](#) takes precedence )
  - E21B 47/026 . . of penetrated ground layers ( [apparatus for obtaining oriented cores E21B 25/16](#); [formation testing E21B 49/00](#) )
  - E21B 47/04 . Measuring depth or liquid level ( [measuring liquid level in general](#) ) { and [telerecorders for level of liquids G01F](#) ; { [measuring depth in general G01B 7/26](#) }
  - E21B 47/042 . . { Measuring or locating liquid level ( [E21B 47/044](#) takes precedence ) }
  - E21B 47/044 . . { using radioactive markers }
  - E21B 47/06 . Measuring temperature or pressure ( [measuring temperature in general G01K](#) ; [measuring pressure in general G01L](#) ) { [telerecorders for pressure G01L](#) ; [telerecorders for temperature G01K](#) }
  - E21B 47/065 . . { Measuring temperature }
  - E21B 47/08 . Measuring the diameter ( [measuring diameter in general G01B](#) )
  - E21B 47/082 . . { using radiant means, e.g. acoustic, radioactive, electromagnetic }
  - E21B 47/09 . Locating or determining the position of objects in boreholes or wells, { e.g. the position of an extending arm }; Identifying the free or blocked portions of pipes ( [measuring depth E21B 47/04](#); [measuring diameter E21B 47/08](#) )
  - E21B 47/0905 . . { by detecting magnetic anomalies ( investigating materials by investigating magnetic variables [G01N 27/72](#) ) }

- E21B 47/091 .. { by detecting an acoustic anomaly, e.g. a mud-pressure pulse }
- E21B 47/0915 .. { using impression packers, e.g. to detect recesses or perforations }
- E21B 47/10 . Locating fluid leaks, intrusions or movements { using impression packers [E21B 47/0915](#); flow measurement in general [G01F](#) ; examining density and leaking in general [G01M](#) }
- E21B 47/1005 .. { using thermal measurements ( measurement temperature [E21B 47/065](#) ) }
- E21B 47/101 .. { using acoustic energy }
- E21B 47/1015 .. { using tracers: using radioactivity }
- E21B 47/102 .. { using electrical indications: using light radiations }
- E21B 47/1025 .. { Detecting leaks, e.g. of tubing, by pressure testing ( investigating fluid-tightness of structures by using fluid or vacuum [G01M 3/02](#) ) }
- E21B 47/12 . Means for transmitting measuring-signals { or control signals } from the well to the surface { or from the surface to the well }, e.g. for logging while drilling ( remote signalling in general [G08](#) )
- E21B 47/121 .. { using earth as an electrical conductor ( [E21B 47/122](#) takes precedence; in general [H04B 13/02](#) ; electric prospecting [G01V 3/00](#) ) }
- E21B 47/122 .. { by electromagnetic energy, e.g. radio frequency ( in general [H04B](#) magnetic prospecting [G01V 3/00](#) ) }
- E21B 47/123 ... { using light waves ( optical transmission in general [H04B 10/00](#); light guides, e.g. optical fibres [G02B 6/00](#) ) }
- E21B 47/124 .. { Storing data down-hole, e.g. in a memory or on a record carrier ( recording in connection with measuring in general [G01D](#) ; information storage in general [G11](#) ) }
- E21B 47/14 .. using acoustic waves
- E21B 47/16 ... through the drill string or casing, { e.g. by torsional acoustic waves }
- E21B 47/18 ... through the well fluid, { e.g. mud pressure pulse telemetry }
- E21B 47/182 .... { by continuous mud waves with modulation of the waves }
- E21B 47/185 .... { by negative mud pulses using a pressure relieve valve between drill pipe and annulus }
- E21B 47/187 .... { by positive mud pulses using a flow restricting valve within the drill pipe }
- E21B 49/00** **Testing the nature of borehole walls; Formation testing; Methods or apparatus for obtaining samples of soil or well fluids, specially adapted to earth drilling or wells ( sampling in general [G01N 1/00](#) )**
- E21B 49/001 . { specially adapted for underwater installations }
- E21B 49/003 . { by analysing drilling variables or conditions ( [E21B 49/005](#) takes precedence; Systems specially adapted for monitoring a plurality of drilling variables or conditions [E21B 44/00](#) ) }
- E21B 49/005 . { Testing the nature of borehole walls or the formation by using drilling mud or cutting data ( investigating chemical or physical properties of materials per se [G01N](#) ) }
- E21B 49/006 . { Measuring wall stresses in the borehole ( investigation of mechanical properties of foundation soil [E02D 1/022](#) ) }
- E21B 49/008 . { by injection test; by analysing pressure variations in an injection or production test, e.g. for estimating the skin factor ( measuring pressure [E21B 47/06](#); obtaining fluid

samples or testing fluids [E21B 49/08](#) ) }

- E21B 49/02
  - by mechanically taking samples of the soil ( apparatus for obtaining undisturbed cores [E21B 25/00](#); investigation of foundation soil in situ [E02D 1/00](#) )
- E21B 49/025
  - .. { of underwater soil, e.g. with grab devices ( underwater coring [E21B 25/18](#) ) }
- E21B 49/04
  - .. using explosives in boreholes; using projectiles penetrating the wall { drilling by use of explosives [E21B 7/007](#); gun or shaped charge perforators [E21B 43/116](#) }
- E21B 49/06
  - .. with side-wall drilling tools { pressing } or scrapers
- E21B 49/08
  - Obtaining fluid samples or testing fluids, in boreholes or wells { ( packers [E21B 33/12](#); valves [E21B 34/00](#); analysing pressure variations in an injection or production test [E21B 49/008](#) ) }
- E21B 49/081
  - .. { with down-hole means for trapping a fluid sample ( [E21B 49/10](#) takes precedence ) }
- E21B 49/082
  - ... { Wire-line fluid samplers ( [E21B 49/083](#) takes precedence ) }
- E21B 49/083
  - ... { Samplers adapted to be lowered into or retrieved from a landing nipple, e.g. for testing a well without removing the drill string }
- E21B 49/084
  - .. { with means for conveying samples through pipe to surface }
- E21B 49/086
  - .. { Withdrawing samples at the surface }
- E21B 49/087
  - .. { Well testing, e.g. testing for reservoir productivity or formation parameters }
- E21B 49/088
  - ... { combined with sampling }
- E21B 49/10
  - .. using side-wall fluid samplers or testers
- E21B 2003/00**
  - Rotary drilling** ( drives used in the borehole [E21B 4/00](#); rotary drilling machines in general [B23B](#) )
- E21B 2003/02
  - Surface drives for rotary drilling
- E21B 2003/05
  - .. with a to-and-fro rotation of the drill pipe or casing
- E21B 2010/00**
  - Drill bits** ( specially adapted for deflecting the direction of boring [E21B 7/064](#); with means for collecting substances [E21B 27/00](#) )
- E21B 2010/08
  - Roller bits ( roller core bits [E21B 10/06](#); with leading portion [E21B 10/26](#); characterised by wear resisting parts [E21B 10/46](#) )
- E21B 2010/22
  - .. characterised by bearing, lubrication or sealing details
- E21B 2010/225
  - ... sealing details
- E21B 2010/24
  - ... characterised by lubricating details
- E21B 2010/243
  - ... with drilling fluid supply to the bearing
- E21B 2010/42
  - Rotary drag type drill bits with teeth, blades or like cutting elements, e.g. fork-type bits, fish tail bits ( characterised by wear resisting parts [E21B 10/54](#), by conduits or nozzles for drilling fluid [E21B 10/60](#), by detachable or adjustable parts [E21B 10/62](#) )
- E21B 2010/425
  - .. characterised by teeth or cutter arrangement
- E21B 2010/46
  - characterised by wear resisting parts, e.g. diamond inserts { ( drill bits with self-renewable cutting edge [E21B 10/006](#) ) }
- E21B 2010/54
  - .. the bit being of the rotary drag type, e.g. fork-type bits

- E21B 2010/545 . . . with blades having performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- E21B 2010/56 . . . Button type inserts ( [E21B 10/52](#) takes precedence )
- E21B 2010/561 . . . Inserts with performed cutting elements mounted on a distinct support, e.g. polycrystalline inserts
- E21B 2010/562 . . . . having a non planar or non circular cutting face
- E21B 2010/563 . . . . having a cutting face with different segments, e.g. mosaic-type inserts
- E21B 2010/564 . . . . characterised by support details
- E21B 2010/565 . . . . . Interface between the substrate and the cutting element
- E21B 2010/566 . . . . with chip breaking arrangements
  
- E21B 2010/60 . . characterised by conduits or nozzles for drilling fluids ( for roller bits [E21B 10/18](#); for percussion drill bits [E21B 10/38](#); { mining picks with arrangement of fluid-spraying nozzles [E21C 35/187](#) } )
- E21B 2010/607 . . . characterised by the nozzle structure
  
- E21B 2010/62 . . characterised by parts, e.g. cutting elements, which are detachable or adjustable ( [E21B 10/64](#) takes precedence; for roller bits [E21B 10/20](#); { for rotary drag type drill bits [E21B 10/42](#) }; for augers [E21B 10/44](#) )
- E21B 2010/622 . . . with plural separable cutter elements
- E21B 2010/624 . . . . independently attachable
  
- E21B 2021/00** **Methods or apparatus for flushing boreholes, e.g. by use of exhaust air from motor** ( freeing objects stuck in boreholes by flushing [E21B 31/03](#); well drilling compositions [C09K 8/02](#) )
  
- E21B 2021/005 . . using gaseous fluids
- E21B 2021/006 . . Underbalanced techniques, i.e. where borehole fluid pressure is below formation pressure
- E21B 2021/007 . . Arrangements for handling drilling fluids or cuttings outside the borehole, e.g. mud boxes
- E21B 2021/008 . . . Means engaging the bore entrance, e.g. hoods for collecting dust
- E21B 2021/06 . . Arrangements for treating drilling fluids outside the borehole ( treating steps per se, see the relevant subclasses )
- E21B 2021/061 . . . for treating dust-loaded gaseous fluids
  
- E21B 2023/00** **Apparatus for displacing, setting, locking, releasing, or removing tools, packers or the like in the boreholes or wells** ( setting of casings, screens or liners [E21B 43/10](#) )
  
- E21B 2023/008 . . Self propelling system or apparatus, e.g. for moving tools within the horizontal portion of a borehole
  
- E21B 2033/00** **Sealing or packing boreholes or wells**
  
- E21B 2033/005 . . Sealings characterised by their shape

- E21B 2033/10 . in the borehole { [sealing the junction between main bore and laterals E21B 41/0042](#) }
- [E21B 2033/105](#) . . characterised by sealing the junction between a lateral and a main bore
  
- E21B 2034/00** **Valve arrangements for boreholes or wells ( in drilling fluid circulation systems [E21B 21/10](#); { [tool diverters E21B 23/002](#); } blow-out preventers [E21B 33/06](#); oil flow regulating apparatus [E21B 43/12](#); valves in general [F16K](#) )**
  
- [E21B 2034/002](#) . Ball valves
- [E21B 2034/005](#) . Flapper valves
- [E21B 2034/007](#) . Sleeve valves
  
- E21B 2041/00** **Equipment or details not covered by groups [E21B 15/00](#) to [E21B 40/00](#)**
  
- [E21B 2041/0028](#) . Fuzzy logic, artificial intelligence, neural networks, or the like
  
- E21B 2043/00** **Methods or apparatus for obtaining oil, gas, water, soluble or meltable materials or a slurry of minerals from wells ( applicable only to water [E03B](#) ; obtaining oil-bearing deposits or soluble or meltable materials by mining techniques [E21C 41/00](#); pumps [F04](#) )**
  
- E21B 2043/01 . specially adapted for obtaining from underwater installations ( [underwater well heads E21B 33/035](#) )
- [E21B 2043/0115](#) . . Drilling for or production of natural gas hydrate reservoirs; Drilling through or monitoring of formations containing gas hydrates
  
- E21B 2043/12 . Methods or apparatus for controlling the flow of the obtained fluid to or in wells ( [E21B 43/25](#) takes precedence; valve arrangements [E21B 34/00](#) )
- E21B 2043/121 . . { [Lifting well fluids \( survey of down-hole pump systems E21B 47/0007 \)](#) }
- [E21B 2043/125](#) . . . Adaptation of walking-beam pump systems
  
- E21B 2049/00** **Testing the nature of borehole walls; Formation testing; Methods or apparatus for obtaining samples of soil or well fluids, specially adapted to earth drilling or wells ( sampling in general [G01N 1/00](#) )**
  
- E21B 2049/08 . Obtaining fluid samples or testing fluids, in boreholes or wells { ( [packers E21B 33/12](#); valves [E21B 34/00](#); analysing pressure variations in an injection or production test [E21B 49/008](#) ) }
- [E21B 2049/085](#) . . Determining specific physical fluid parameters